

CLAIMS

What is claimed is:

1. A method comprising:  
forming a semi-crystalline polymer material into a lamella; and  
stretching the lamella into a polymer comprising a node of folded lamella and a fibril orientation;
2. The method of claim 1, wherein stretching the lamella comprises stretching at a temperature of up to room temperature.
3. The method of claim 1, wherein prior to forming a lamella, the method comprises:  
forming a pseudo-gel of semi-crystalline polymer material and a solvent.
4. The method of claim 3, wherein the semi-crystalline polymer material comprises an ultra-high molecular weight polyethylene.
5. The method of claim 4, wherein the solvent is selected from the group consisting of mineral oil and paraffin oil.
6. The method of claim 3, wherein prior to stretching the lamella, the method comprises removing a portion of the solvent.
7. The method of claim 1, wherein following stretching the lamella into a polymer, annealing the polymer at a temperature sufficient to define the node and fibril orientation.
8. A method comprising:  
extruding a pseudo-gel comprising an ultrahigh molecular weight polyethylene material into a lamella;  
stretching the lamella into a polymer comprising a node of folded lamella and a fibril orientation; and

annealing the polymer at a temperature sufficient to define the node and fibril orientation.

9. The method of claim 8, wherein stretching the lamella comprises stretching at a temperature of up to room temperature.
10. The method of claim 8, wherein prior to stretching the lamella, the method further comprises quenching the lamella sufficient to bring the temperature of the lamella below a melt temperature of the ultrahigh molecular weight polyethylene material.
11. The method of claim 8, wherein prior to extruding the pseudo-gel, the method comprises:  
forming a pseudo-gel of ultrahigh molecular weight polyethylene material and a solvent.
12. The method of claim 11, wherein the solvent is selected from the group consisting of mineral oil and paraffin oil.
13. The method of claim 11, wherein prior to stretching the lamella, the method comprises removing a portion of the solvent.
14. The method of claim 11, wherein prior to forming the pseudo-gel, the method comprises, combining the ultrahigh molecular weight polyethylene material with the solvent, wherein the amount of the ultrahigh molecular weight polyethylene material is on the order of 5 to 30 percent by weight.
15. The method of claim 8, wherein the annealing temperature comprises a temperature above the crystalline melting point of the ultrahigh molecular weight polyethylene material.
16. The method of claim 8, wherein the annealing temperature is on the order of 147°C.

17. An apparatus comprising:  
a body portion formed of a dimension suitable for a medical device application and comprising a semi-crystalline polymer arrayed in a node of folded lamella and a fibril orientation.
18. The apparatus of claim 17, wherein the body portion comprises a catheter balloon.
19. The apparatus of claim 17, wherein the body portion comprises a film having dimensions suitable for a graft.
20. The apparatus of claim 17, wherein the polymer is selected from the group consisting of polyalkylene polymers, polyolefin polymers, and polyoxymethylene-acetyl co-polymers.
21. The apparatus of claim 17, wherein the polymer comprises ultra high molecular weight polyethylene.
22. The apparatus of claim 17, wherein the polymer has an auxetic property.
23. An apparatus comprising:  
a body portion comprising an ultra-high molecular weight polyethylene material arrayed in a node of folded lamella and a fibril orientation.
24. The apparatus of claim 23, wherein the body portion comprises fibers of the ultra-high molecular weight polyethylene material.
25. The apparatus of claim 23, wherein the body portion comprises a film of the ultra-high molecular weight polyethylene material.
26. The apparatus of claim 24, wherein the body portion is formed of a dimension suitable for a medical device.

27. The apparatus of claim 26, wherein the body portion comprises a catheter balloon.
28. The apparatus of claim 26, wherein the body portion comprises a film having dimensions suitable for a graft.
29. The apparatus of claim 24, wherein the polymer has an auxetic property.
30. The apparatus of claim 2, wherein the ultra high molecular weight polyethylene material comprises an internodal distance of 10 microns and 500 microns.